

## SOIL HEALTH FIRST

In any teaspoon of soil there are tens of thousands of microbial species which are fundamental to maintaining soil health. The foundation to growing healthy crops and preventing disease – soil stores and filters water, provides nutrients to plants and is intimately involved in climate regulation.

### Monoculture

Inorganic pesticides, fertilizers, and antibiotics has left us with degraded soils, biodiversity loss, and poor-quality food. It is increasingly evident that we are facing a crisis with our global food system. As a result, there is a growing demand for

### Polyculture

Regenerative agriculture utilizes organic farming methods which are centered around soil health and biodiversity to create a sustainable and resilient food system. By working with nature instead of against it, we can produce nutrient-dense food while benefiting the environment and our health.

**1. Minimize soil disturbance** - In industrial crop production, soils are typically disturbed with tilling to temporarily aerate the soil resulting in a short burst of microbial activity, releasing too many nutrients for the plant to take up which are then easily washed away when it rains. This leads to nutrients being lost from the system and a depletion in soil fertility. Disturbed soil functions less efficiently and negatively impact crop growth and nutrition. Therefore, regenerative agriculture minimizes soil disturbance by avoiding digging and raking, preserving soil health.

**2. Keep the soil covered** - Ensuring the soil is not left bare is crucial for preventing soil erosion and maintaining soil health. Planting cover crops in-between growing seasons (crops which are grown but not harvested to protect and feed the soil), particularly nitrogen fixing plants such as clover, is a great way to add organic matter to the soil and prevent erosion as the roots help hold the soil together. Materials such as foliage and cardboard can also be used as mulch to cover and protect the soil.

**3. Diversity is key** - In contrast to industrial monoculture, regenerative agriculture uses crop rotation, intercropping, and polyculture where a variety of crops are grown together. Growing a diversity of plants is essential for creating a resilient food system as it makes plants less vulnerable to pests/disease and has greater opportunity to adapt to changes in the system such as extreme weather events. Combined with minimal soil disruption, a diversity of plants leads to a plethora of soil life, which maximizes nutrient cycling and plant nutrient uptake, thereby maximizing crop health. A variety of plants species will also attract a mix of above ground insects and animals which also form beneficial symbioses. Increasing diversity by incorporating trees into the system, known as agroforestry, offers multiple benefits including improving soil health, increasing yield and productivity, and

providing extra habitat for wildlife. Crops can be grown beneath trees, occupying distinct levels above and below ground – the deeper tree roots extract nutrients further down which are inaccessible to smaller crops. The habitat trees provide also attracts natural pest predators reducing the need for pesticides. The trees can also be harvested as an alternative if crops fail and are great carbon sequesters, helping mitigate climate change.

**4. Keep it organic** - Industrial agriculture typically uses vast quantities of chemical fertilizers which leach from the soil into water systems creating harmful algal blooms. Chemical pesticides are not selective, killing beneficial insects and diminishing soil life. This forms a vicious cycle with the depleted soil and unhealthy crops becoming increasingly dependent on pesticides and fertilizers. Instead, implementing soil protection measures, crop rotation and polyculture, as discussed above, will build rich fertile soils and healthy resilient crops, minimizing the need for pesticides and fertilizers. Cover crops, particularly nitrogen fixing ones will help increase soil fertility. A diversity of crops will also attract a diversity of insects which function as a natural pest control method by preventing a single pest proliferating.

**5. Incorporate livestock** - When managed correctly, integrating livestock can enable a resilient, self-reliant farming system. Sustainable livestock practices include rotational grazing (cattle are regularly moved into new fields to avoid overgrazing and allow regrowth), pasture cropping (incorporating perennial plants among crops), and silvopasture (grazing animals under trees). Livestock can eat cover crops, help control arable weeds, and convert the biomass into manure which fertilizes the soil, improving soil and crop health.

